Total: Name:

Math 126 **Introductory Quiz** **Fall 2018**

Write neat, concise, and accurate solutions to each of the problems. No electronic devices are allowed.

1. Evaluate 64.4×2.25.

short way $64.4 \cdot 2\frac{1}{4}$

$= 128.8 + 16.1 = 144.9$

long way

$$\begin{array}{r} 64.4 \\ \times\ 2.25 \\ \hline 3220 \\ 1288 \\ 128\,8 \\ \hline 144.900 \end{array}$$

$64.4 * 2.25 = 144.9$

2. Express $400/17$ as a decimal, correct to the nearest hundredth.

$$17\overline{)400.000}\quad 23.53$$

34
60
51
90
85
50

$\frac{400}{17} \approx 23.53$

3. Express $3 \cdot \frac{20 \cdot 21 \cdot 41}{6} + 4 \cdot \frac{20 \cdot 21}{2} - 4 \cdot 20$ as an integer.

$= 10(21 \cdot 41 + 4 \cdot 21 - 8)$
$= 10(21 \cdot 45 - 8)$
$= 10(945 - 8)$
$= 9370$

4. Find the sum $\frac{7}{6} + \frac{4}{5}$.

$\frac{7}{6} + \frac{4}{5} = \frac{35+24}{30} = \frac{59}{30}$ or $1 + \frac{1}{6} + 1 - \frac{1}{5} = 2 - \frac{1}{30} = \frac{59}{30}$

5. 120 is 80% of what number?

$0.8\,x = 120$

$x = 120 \cdot \frac{5}{4} = 150$ so 120 is 80% of 150

6. List the numbers 274, 0.4389×274, and $274 \div 0.8722$ in increasing order.

$0.4389 \cdot 274 < 274 < \frac{274}{0.8722}$

(multiply by < 1 versus multiply by > 1)

7. Find the perimeter and area of a rectangle that has a length of $18\frac{2}{3}$ feet and a width of 7.5 feet.

$P = 2(18\frac{2}{3} + 7.5) = 36\frac{4}{3} + 15 = 52\frac{1}{3}$ feet

$A = 18\frac{2}{3} \cdot 7.5 = \frac{56}{3} \cdot \frac{15}{2} = 28 \cdot 5 = 140$ square feet

8. Let $f(x) = \frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x$. Compute $f(4) - f(1)$.

$f(4) - f(1) = \frac{64}{3} - 40 + 16 - \left(\frac{1}{3} - \frac{5}{2} + 4\right)$

$= 21 - 24 - \frac{3}{2}$

$= -\frac{9}{2}$

9. Express $\dfrac{4}{x+1} + \dfrac{3}{2x-5}$ as a single fraction.

$\frac{4}{x+1} + \frac{3}{2x-5} = \frac{8x - 20 + 3x + 3}{(x+1)(2x-5)} = \frac{11x - 17}{(x+1)(2x-5)}$

10. Give the values of $\sin(\pi/3)$, $\cos(\pi/2)$, and $\tan(\pi/4)$.

$\sin\frac{\pi}{3} = \sqrt{3}/2$

$\cos\frac{\pi}{2} = 0$

$\tan\frac{\pi}{4} = 1$

11. Use the technique of completing the square to find the vertex of the parabola $y = x^2 - 6x + 20$.

$y = x^2 - 6x + 20 = (x-3)^2 + 11$

The vertex is $(3, 11)$.

12. Find all values of x that satisfy the equation $x^3 = 13x$.

$x^3 - 13x = 0$

$x(x^2 - 13) = 0$

$x = -\sqrt{13}, 0, \sqrt{13}$

13. Find all values of x that satisfy the equation $x^2 - 4x = 11$.

$x^2 - 4x = 11$

$x^2 - 4x + 4 = 15$

$(x-2)^2 = 15$

$x = 2 \pm \sqrt{15}$

$x^2 - 4x - 11 = 0$

$x = \dfrac{4 \pm \sqrt{16 + 44}}{2}$

$= 2 \pm \sqrt{15}$

14. Find all values of x that satisfy the equation $\sqrt{x^2 - 9} = 4$.

$\sqrt{x^2-9} = 4$

$x^2 - 9 = 16$

$x^2 = 25$

$x = \pm 5$

15. Find the quotient when $x^3 - 4x^2 + 7x - 6$ is divided by $x - 2$.

$$x-2 \overline{)\, x^3 - 4x^2 + 7x - 6}$$

$x^3 - 2x^2$

$-2x^2 + 7x - 6$

$-2x^2 + 4x$

$3x - 6$

$3x - 6$

The quotient is $x^2 - 2x + 3$

synthetic division method

	1	-4	7	-6
2	1	-2	3	0

16. Evaluate $\lim_{x\to\infty} \dfrac{x^3 - 4x + 7}{8 + 5x^2 - 3x^3}$.

$= \lim_{x\to\infty} \dfrac{x^3 - 4x + 7}{8 + 5x^2 - 3x^3} \cdot \dfrac{\frac{1}{x^3}}{\frac{1}{x^3}} = \lim_{x\to\infty} \dfrac{1 - \frac{4}{x^2} + \frac{7}{x^3}}{\frac{8}{x^3} + \frac{5}{x} - 3} = -\frac{1}{3}$

17. Find $f'(x)$ if $f(x) = xe^{2x^2}$.

$f'(x) = x \cdot e^{2x^2} \cdot 4x + e^{2x^2} = (4x^2 + 1)\, e^{2x^2}$

18. Find $g'(x)$ if $g(x) = \ln(x^2 + 3x + 5)$.

$g'(x) = \dfrac{2x + 3}{x^2 + 3x + 5}$

19. Find $F'(2)$ for the function $F(x) = \dfrac{x}{x^2 - 1}$.

$F'(x) = \dfrac{(x^2 - 1) - x\,2x}{(x^2-1)^2} = -\dfrac{x^2 + 1}{(x^2-1)^2}$

$F'(2) = -\dfrac{5}{9}$

20. Answer true or false for each of the statements:

F a. $(a+b)^2 = a^2 + b^2$ $\quad (a+b)^2 = a^2 + 2ab + b^2$

F b. $x^{-2} = \sqrt{x}$ $\quad x^{-2} = \frac{1}{x^2}$, $\sqrt{x} = x^{1/2}$

F c. $\sqrt{y^2} = y$ $\quad \sqrt{y^2} = |y|$

F d. $\sqrt{x^2 + y^2} = x + y$ $\quad$ see part (a)

F e. $\frac{a^2+b}{ac} = \frac{a+b}{c}$ $\quad \frac{a^2+b}{ac} = \frac{a^2}{ac} + \frac{b}{ac} = \frac{a}{c} + \frac{b}{ac}$

T f. $\frac{x-y}{z} = \frac{x}{z} - \frac{y}{z}$

21. Sketch a graph of the function given on the figure.