NAME: ——————————————————— Panther ID: ———————————————————

Background Homework – Calculus 1, Spring 2017 – due Tuesday Jan. 17

1. (2 pts) Factor.

$$x^2 - 2x - 15 =$$

2. (4 pts) Simplify as much as possible (assume $x \neq \pm 2$).

$$\frac{4x}{x^2 - 4} - \frac{2}{x+2} =$$

3. (4 pts) Simplify as much as possible.

(a) $\left(\dfrac{4}{25}\right)^{-1/2} =$

(b) $\dfrac{\sqrt[3]{a^7 b}}{\sqrt[3]{ab^4}} =$

4. (4 pts) (a) (1 pt) Find the distance between the points $(0,2)$, $(2,-2)$. (OK to leave answer as a square-root.)

(b) (3 pts) Find the equation of the line that contains the points $(0,2)$, $(2,-2)$.

5. (6 pts) Sketch the graph of each of the following functions and mark the coordinates of axis intercepts.

(a) $f(x) = 3 - x^2$

(b) $g(x) = 2x - 3$

6. (6 pts) True or False? Assume a, b are positive real numbers. Circle "True" if the equality holds for all a, b. Otherwise, circle "False".

$$\sqrt{a^2 + b^2} = a + b \qquad\qquad \text{True} \qquad \text{False}$$

$$\frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab} \qquad\qquad \text{True} \qquad \text{False}$$

$$\frac{1}{a+b} = \frac{1}{a} + \frac{1}{b} \qquad\qquad \text{True} \qquad \text{False}$$

$$\ln(a+b) = \ln a + \ln b \qquad\qquad \text{True} \qquad \text{False}$$

$$\ln(a^b) = b \ln a \qquad\qquad \text{True} \qquad \text{False}$$

$$\sec^2 a = 1 + \tan^2 a \qquad\qquad \text{True} \qquad \text{False}$$

7. (6 pts) Fill in the exact values:

$\cos(\pi/3) =$ $\qquad\qquad$ $\tan(5\pi/4) =$ $\qquad\qquad$ $\sin^{-1}(1) =$

$\log_{10}(1000) =$ $\qquad\qquad$ $\ln\left(\frac{1}{e^2}\right) =$ $\qquad\qquad$ $\log_3(\sqrt{3}) =$

8. (6 pts) Consider the functions $f(x) = \sqrt{4 - x^2}$ and $g(x) = x^2 + 2$.

(a) (2 pts) Find the domain of the function $f(x)$.

(b) (2 pts) Find a formula for the composition $(g \circ f)(x)$.

(c) (2 pts) Compute and simplify the expression for $\frac{g(x+h) - g(x)}{h}$.

9. (12 pts) Find all solutions of the following equations (3 pts each):

(a) $x^3 - 5x^2 + 6x = 0$

(b) $5 \cdot (3^{2x}) = 7$ Leave your answer as a logarithm for this one.

(c) $2\cos x + 1 = 0$ OK to find all solutions $x \in [0, 2\pi]$ for this one.

(d) $ax^2 + bx + c = 0$ I want to check you know the quadratic formula.

10. (4 pts) In the right-angle triangle $\triangle ABC$ the right angle is at B and the sides BA and BC have lengths 3cm and 4cm, respectively. Let D and E be points on the sides BA and BC, respectively, so that the line DE is parallel to AC and the segment AD has length of 1cm. What is the length of the segment DE?