Math 172 | Practice Exam 1 | Name: _____

Summer 2016 | Show Appropriate Work | Point Values in $\boxed{\text{boxes}}$.

1. Integrate.

   (a) $\boxed{10}$ $\displaystyle\int_0^3 t^2\sqrt{1+t}\,dt$

   (b) $\boxed{10}$ $\displaystyle\int x \arctan x\,dx$

   (c) $\boxed{10}$ $\displaystyle\int_0^{\pi/2} \sin^3 2\theta\,d\theta$

2. Integrate.

(a) $\boxed{10}$ $\displaystyle\int \frac{x^3}{\sqrt{1-x^2}}\,dx$

(b) $\boxed{10}$ $\displaystyle\int \frac{4x}{x^2-4x+8}\,dx$

(c) $\boxed{10}$ $\displaystyle\int \frac{4x^2+5x+3}{x(x+1)^2}\,dx$

3. $\boxed{10}$ Consider the region bounded by the graphs of $y = x^2$ and $y = x + 2$. Carefully sketch the region. Find the volume of the solid generated by rotating the region about the line $y = -1$.

4. $\boxed{10}$ Consider the region between the graph of $y = e^x$ and the x-axis for $x \in [0, 1]$. Carefully sketch the region. Find the volume of the solid generated by rotating the region about the y-axis.

5. $\boxed{10}$ Consider the area between the graphs of the functions $y = x^2$ and $y = x$ for $x \in [0, 2]$. Carefully sketch the graphs and find the area.

6. $\boxed{10}$ Calculate the work (in joules) required to pump all of the mystery fluid of density ρ out of a full tank on the planet Zanabar with gravitational constant g. The tank is in the shape of the graph of $y = x^4$ for $x \in [0, 2]$ rotated about the y-axis. The mystery fluid is pumped out a spout of length 1 m from the top of the tank.