**Cell Biology and Physiology Study Guide**

**Exam 4 and Final**

* **Review study guides from previous exams for the comprehensive portion!!**
* Microtubules
	+ What is the major protein?
	+ Where do microtubules originate?
	+ Are the polar?
	+ What are the associated motor proteins?
	+ What is anterograde and retrograde transport?
* Label:



* Intermediate filaments
	+ Are the polar?
	+ Where do you find them?
	+ What are lamins?
* Cell cycle – what are the 4 main phases?
	+ What are mitogens?
	+ What are cyclin dependent kinases? How do they function?
	+ Explain what is happening here:



* Embryo development, in mice and humans, what is the 8-cell stage? What is the 16-cell stage? What is the blastocyst? What are the parts of the blastocyst?
* Where are embryonic stem cells located? What is pluripotent?
* What are adult stem cells? What is multipotent? What are examples found in humans?
* What are Par proteins?
* Apoptosis – genes involved in cell death encode proteins with 3 distinct functions, what are these?